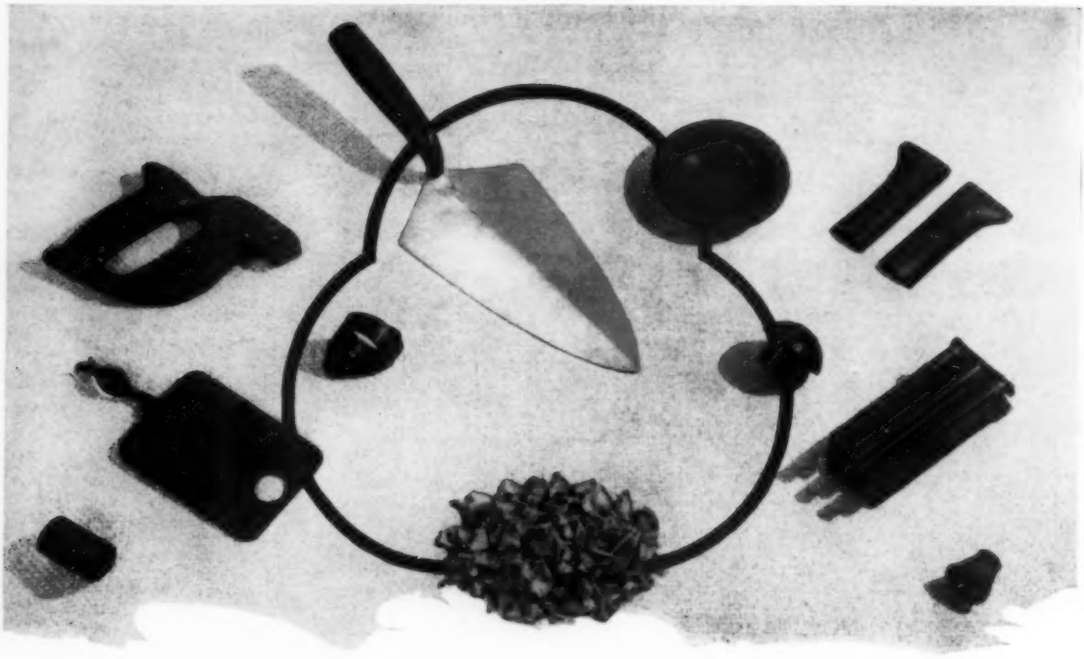
PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products



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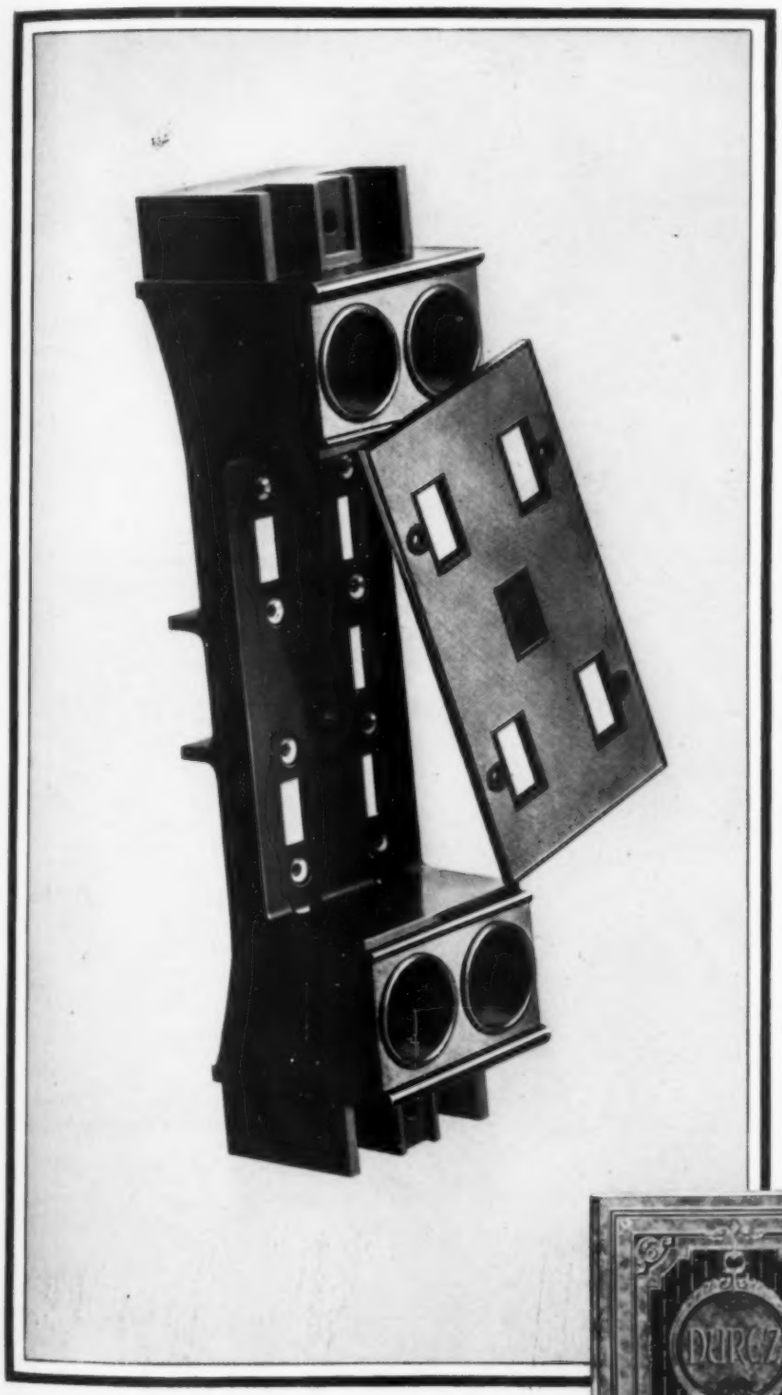
And a tool has not touched it



IN LOOKING for a satisfactory material from which to manufacture switchboard panels for the Trumbull Electric Manufacturing Company, of Plainville, Conn., the American Insulator Corporation hit upon Durez. Since using Durez they have been able to speed up production, cut down cost and reduce the number of rejections.

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PLASTICS & MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 MAY 1928 No. 5

The Patent History of Composite Gear Wheels

Although the art dates back to 1866, the greatest development came within the past decade

By Joseph Rossman

B. S. Chem. Eng. LL. B. M. A. M. P. L.

The writer's close contact with the development of the modern molded and laminated gears, through his association with the division of the U. S. Patent office covering this art, particularly fits him to discuss the changes that have marked the rise of this industry.

IT has been the aim of all machine builders to produce silent and smooth working mechanisms. A rattling and noisy gear is not only an inefficient element but is also annoying to the operator. Very often a metallic gear, such as the timing gear of an automobile, will be noisy in its operation. The metallic body of the gear transmits its vibration to the rest of the machine and to the operator. Silent gears have been developed to eliminate these objections. In using materials other than metal, care must be taken that the material will be sufficiently strong to be used with safety in transmitting power. In order to give satisfactory and cheap noiseless gears many materials have been utilized in their construction. A single sheet of paper for example does not have very great transmission value but when a number of sheets are superposed and united by a hard binder such as Bakelite a very effiicient and noiseless gear is produced.

The majority of patents on laminated gears have been granted within the last ten years. The production of noiseless gears, however, has been attempted many years ago. In 1866 a British patent No. 95 was granted to Robert Mathers for a noiseless gear. He placed between two metal end plates a series of discs of hide, skin, leather or paper reinforced with sheets of zinc or brass. This assembly was then subjected to pressure and secured together by rivets. The gear teeth were cut after the gear blank was completed or the separate disks were stamped out with gear teeth. Spur wheels as well as bevel gears were made by this method.

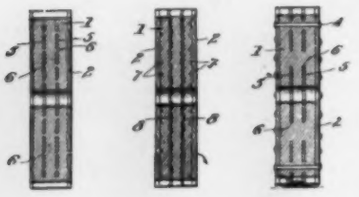
An interesting U. S. patent No. 287,711 was also granted in 1883 for a noiseless, laminated gear wheel. Disks of vulcanized fiber are stamped or cut each having a central opening. The several disks are then glued or cemented together and secured between templets under pressure. The teeth are then cut in the same manner as in metallic gears. The templets are removed and the gear body is secured between metal plates. A strong, hard and durable gear is produced by this method. This patent also states that it has been proposed to construct noiseless gear-wheels of leather, or of paper or paper-board, but such wheels do not have the requisite degree of strength to render them capable of use in heavy machinery. To render such wheels more durable it has been proposed to employ metallic plates between the plates of paper or leather, but this construction is objectionable, because the narrow metallic plates wear rapidly.

Types of Materials Used For Making Composite Gears

Many materials have been utilized in the patents granted for laminated gear wheels. The older patents use layers of leather, raw hide, vulcanized fiber, muslin, silk, cork, etc. A number of patents utilize spin-

nable textile fibers such as cotton, flax, hemp, ramie, wool and silk. They can be subjected to a high degree of compression without destroying or impairing their characteristic properties. When a mass of such fibers is compressed each fiber is in frictional contact with many other fibers giving a coherent and strong mass. The disks are cut from a batten or layer of these fibers and united by a binder to form a gear. Spinnable textile fibers are used in patent No. 1,061,770, No. 1,275,906 and others.

The layers of fibrous material have been reinforced by metallic plates so as to give them great strength and rigidity as in patent Nos. 1,085,420 and 1,253,294.



The Gear of Baekeland patent 1160364

An early patent No. 1,160,364 to Baekeland uses a number of sheets of stamped metal such as steel or brass united by Bakelite and a filling material such as wood fiber or asbestos. Sheets of wood, cardboard or paper may be impregnated with Bakelite and inserted between the metal plates. Graphite may be added. It acts as a lubricant and increases the noiseless operation of the gear. Graphite and wax are used in patent No. 1,401,622.

A fabric made of interwoven threads of cotton and metal wires is used in making gears in patent No. 1,438,875.

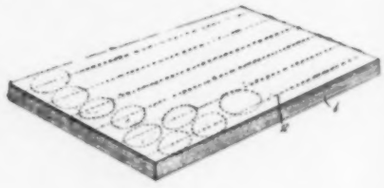
Various woven fabrics have been used for the gear layers. Duck is used by many patents. It is preferred on account of its resilient qualities and close knitting effect which is obtained when layers of it are bound together by means of an adhesive which has been hardened under heat and pressure. The duck has an irregular surface and tends to retain the binder especially if it has graphite as in patent No. 1,401,622. Cotton duck is also used in patent No. 1,223,348. In patent No. 1,472,147 shredded duck is used and in patent No. 1,504,596 layers of duck and cork are used. Almost any available fabric can be used to build up a laminated gear. Many fabrics, which can not all be enumerated here, are mentioned in the patents as being suitable.

Conrad Patents

An interesting case concerning noiseless gears arose in Westinghouse Electric & Mfg. Co. vs. Formica Insulating Co. 272 Fed. 667 holding patents Nos. 1,167,742 and 1,167,743 to Conrad void for lack of invention. These patents cover gears made of layers of fabric united by Bakelite. The court held that the same process was used in building up cardboard layers united by Bakelite in the patent to Baekeland No. 1,019,406, and that it involved no invention over the old type of gear made from layers of parchmentized paper united together by the gelatinized surface of the paper. Conrad's use of Bakelite as a binder was held to be a mere skillful selection of material rather than invention even though the new gear was a superior product.

Typical Processes For Making Gears

The earliest method used in making gears consisted in cutting disks from any fibrous material such as paper or cloth and piling them one on the other in a metal holder united the desired thickness is obtained. The body thus formed is then subjected to heavy compression, which compression is retained by said holder. Instead of mounting the woven cloth rings or disks in a holder in the manner described, it is possible for some classes of work to impregnate the cloth with a binder and depend solely or partially on it to hold the laminations in a compressed state. Instead of first cutting the cloth to shape, said cloth may also be assembled into a laminated structure from which the disks or rings are thereafter cut, as in patent No. 1,173,433.



How gear blanks are cut from stitched laminated material U. S. P. 1173433

A number of gears can be made in one operation by placing the gear blanks in a long mold with spacers between each gear and compressing all the layers in one pressing operation. Patent No. 1,354,156.

In another method from what is commonly termed "bats," meaning thereby sheets or bodies of textile fibers in a more or less soft and fluffy state. These bats are compressed into sheets from which rings or disks are cut by means of dies as in the first case. The disks are then piled one on the other in a holder until the desired thickness is obtained to form the finished blank. The material thus formed is then subjected to heavy pressure, which pressure is retained by suitable means. This process is disclosed in patent No. 1,061,770.

Avoiding Waste

Due to the fact that the disks or rings are cut out of sheet stock by dies, or other means, it follows that a considerable amount of stock in the form of trimmings is wasted in the manufacture. It is evident that it costs money in the first instance to form the cloth or compressed bats of which these trimmings are composed, and while in both

cases, and more especially in the case of bats the material may be used over again after being suitably treated, it can only be done at a further expense.

In order to avoid waste of material many methods have been devised. In patent No. 1,275,906 the loose unwoven textile fibers are wound around a mandrel impregnated with a binder and then compressed. Various fibrous materials such as cotton, rags, or asbestos have been impregnated with a binder either in the liquid or in the dry form and molded into a gear (patent No. 1,298,816). In patent No. 1,482,847 sponge and Bakelite are molded into a cylinder from which separate disks are cut to form gear blanks.

Coiled Material

A number of patents have been also granted for various methods of cutting the fabric so that no material is wasted and at the same time producing a strong gear. In patent No. 1,315,896 small, curved segments are cut out from the stock fabric which are superimposed to form a gear. Continuous coils of flat material may be also used. These coils can be coiled into the die by cutting V shaped notches out of the inside, so there would be no overlap of material. Separated ropes or twisted threads are also used to fill the die so as to economize in the material. In patent No. 1,424,267 a plurality of strips of fibrous sheet materials are used and folded to form a plurality of superposed continuous layers having the laminations radially disposed with respect to the hub. Other methods of cutting the material are disclosed in patent No. 1,440,440, No. 1,501,026, No. 1,501,027, No. 1,573,629, No. 1,599,550.

The following abstracts of the U. S. patents will give the reader a more detailed review of the different gear structures and the process for making them.

1. Miller 1,061,770. May 13, 1913.

Noiseless pinions or gear-wheels have previously been made of layers of leather, rawhide, paper or indurated fiber, but pinions or gear-wheels made of these materials are objectionable for they deteriorate rapidly in use, shrink and swell according to the amount of oil or moisture absorbed and are easily stripped of their teeth. It has been proposed to interpose between layers of these various materials, sheets of metal to sustain the stresses imposed upon the teeth, but such interposed sheets of harder material are highly objectionable in that they cut and destroy the smooth sliding surfaces of the teeth of the gears meshing therewith, and only partially overcome the objections to the ordinary gear. According to the patent pinions or gear-wheels are made up of spinnable textile fibers highly compressed. They are strong, durable, do not shrink or swell. Spinnable textile fibers includes cotton, flax, hemp, ramie, wool and silk. Circular disks are cut from a batten or layer of the fibers and stacked one above the other in a press by which they are compressed. After the textile body of the gear has been compressed to the proper degree between the metallic end plates

(*Continued on page 268*)

Huge Hydraulic Press

H. J. Grigoleit introduces monster machine for battery box construction

By far the largest and most powerful hydraulic presses ever used in molding Bakelite have recently been designed and are now being produced in the plant of the H. J. Grigoleit Company, in Jackson, Mich., for the making of battery boxes for automobile and radio batteries. The H. J. Grigoleit Company is a subsidiary of the Reynolds Spring Company.

These presses, which develop 350 tons of pressure and have several novel features, turn out the Bakelite battery boxes in one operation, molding the four sides and bottom of each box simultaneously and employing only one mold in the work.

Automatic Control

The first press of this kind, to be made in the Grigoleit plant, was of the semi-automatic type but this press and its mold, as well as those which have followed it, can be operated entirely automatically by being connected to automatic hydraulic valves which may be set to have the desired cycles.

Among the novel features of this press is a pull-back cylinder cast within and integral with its main working cylinder. This casting alone weighs 7,200 pounds. This press also has a big ram with a diameter of 19 inches and a stroke of 20 inches which generates the full 350 tons of pressure when working at 2,500 pounds per square inch of hydraulic pressure. It also has a pull-back ram, 6 inches in diameter which develops 35 pounds of pressure at 2,500 pounds per square inch of hydraulic pressure.

The mold for making the battery boxes, with which this press is equipped, is of unique design, inasmuch as it is of the thoroughly mechanical, collapsible type. As the molding of each battery box is completed and the press is on its upstroke, and within one inch of being fully opened, it begins to raise the lock wedge blocks, of which there are four, one for each side of the mold. Upon traveling the remaining inch, it fully unlocks the mold. The sides of the mold are now ready to be spread

(*Continued on page 270*)

Mechanical Properties of Plastics

Fundamental research into the field of the influence of mechanical treatment on the qualities of plastic materials will lead to the production of superior products

By O. Manfred and J. Obrist

A communication from the German Technical High School at Brünn

THE marked effects of mechanical working upon the mechanical and plastic properties of the casein plastics has been discussed in the earlier portions of the present dissertation on this subject and in general the relationship of the elaticity to the state of re-aggregation of the micellae of the material has been pointed out. The still broader relationship found in analogous materials, such as the phenol and other resins, as well as the similarity to the effects found in metals, is now taken up.

When considering, for example, the relationships found to exist between the different types of casein solids, and when contrasting and comparing them with the mechanical properties of such plastic substances as the various kinds of rubber, cellulose esters, clays and gelatins, it becomes very evident that the same fundamental facts can there be found. When adding to the sphere of observation the metals, this becomes even more evident.

Plasticity of Metals

For example G. Tammann (in his Lehrbuch der Metallopraphie, 2nd edition, 1921, p. 57) has pointed out that metals, when subjected to long continued stresses wll undergo a change in their modulus of elasticity to an extent as great as 20%. According to this author the changes that occur when metals are worked in the cold are similar to those occuring when

The similarity between the effects of drawing and cold working of metals and the plastification of the raw materials employed in plastics are pointed out in this article.

For the preceding articles in this series see PLASTICS for March, p. 131, and April p. 189.

there are added, to the metal, substances capable of forming mixed crystals with the metal of which the object consists. Certain chemicals also act in quite the same manner when added to non-metallic materials.

In the latter case the best condition is usually to be found about midway between the extremes of dispersity, just as C. Benedicks and Wo. Ostwald have found to be the case with alloys. (See Zeitschrift f. physik. Chemie, 1905, 52,6; Jour. Iron and Steel Institute 1911, 11,352; Kolloid Zeitschrift 1910, 7, 290; Wo. Ostwald, "Die Welt der vernachlässigten Dimensionen, 7th and 8th edition, 1922, p. 176. A similar relationship between the degree of dispersion and the plasticity of clays has been shown by H. G. Schurecht in the Jour. Amer. Ceramic Society Bulletin, 1922, 1,153). The strengthening of metals when subjected to prolonged stresses and deformation finds its analogy in plastics in the marked effect produced on artificial silk (Rayon) when the same is produced by the particular spinning or extrusion process where the filament is subjected to a stretching action immediately upon its issuing from the spinnarets.

Visible Effects

Even by mere visual inspection the metals exhibit plastic properties, although of course this does not necessarily alone constitute proof of this assertion. Anyone, however, who has ever closely observed the behavior of a metallic rod while it was being subjected to tearing in half while being tested for tensile strength in a testing machine, and has noticed the diminution of the diameter of the rod near the point where the break was ready to take place, must have been struck by the apparent appearance of what looked like a fibrous coating on the surface of the rod.

Tammann has set up the theory that what decides whether a crystalline conglomerate will exhibit plastic properties is a function of the nature of the material, and will be the decisive factor if the crystals are such that they give rise to surfaces capable of sliding upon each other. Our explanation, based upon the desaggregation of the gel-structure is in harmony with this theory.

A quantitative concept of the relationship between the terms of exterior work, degree of plastification and the changes in properties of the materials so treated, is at present still impossible until general and comprehensive definitions of the terms "Plasticity," "Nerve," "Brittleness" and "Hardness" can be given. The advanced state of knowledge in this field in the line of metals, and the remarkable similarity now being found in the field of non-metals, and a careful study of the relationship from the viewpoint of dispersoidology (if one may term this study by this name) will without doubt throw a great deal of light upon this, as yet dark, subject. Such a study will also serve to remove the present differences in our concepts as to what are metals and what are not. It was one of our objects, in carrying out the present line of investigation, to contribute something to the general knowledge in this field.

Summing Up

The sum up the present state of our knowledge in this field, inasfar as the investigations permit, the following facts may be considered as definitely established:

The remarkably great differences between the moduli of elasticity of various casein solids made by different methods strongly bear out the explanations and theories advanced. The striking similarity in the conditions encountered with metals also supports this. The same observations have been made and recorded in the case of rubber. Even with aqueous suspensions of clays changes in the viscosity and the surface tension of the suspensions were found to be effected by mechan-

(*Continued on page 270*)

Artificial Horn From Leather Scrap

Formaldehyde Used to Harden the Material

JUSTUS Ellenberger, of Germany, proposes in his recently granted U. S. P. 1,649,675, Nov. 15, 1927, to produce a substance resembling horn from the nitrogenous residue remaining after the degluing of leather scrap.

In carrying out the invention the residue of nitrogenous substances from which the glue-forming matter has been removed, is used.

In the manufacture of glue and gelatine from chrome leather by boiling it with slightly alkaline water in the presence of a suitable magnesium compound such as caustic burnt magnesite, there is left after the glue or gelatine has been removed a scutch or residue that contains approximately 20% nitrogenous matter (with which is admixed chromium and magnesium compounds) and about 80% water. Similar nitrogenous material derived from animal sources (hereinafter deemed to be included in the term "scutch") may be employed.

The scutch which is of a pulp-like nature is firstly strained through a metal screen to eliminate any foreign matter and may be pressed to reduce the water content. It is then mixed with an absorbent binding material, such as saponified resin, or a suitable hygroscopic substance such as calcium chloride, magnesium chloride or the like. The mixture is afterwards thoroughly kneaded and subjected to pressure. It is then placed in a solution of formaldehyde for a suitable period and afterwards rinsed and dried as in hereinafter more particularly described.

In some cases an organic acid such as acetic acid is added before the material is pressed in order to increase its suppleness and to wholly or partially render soluble any chromium that may be present.

Fillers, such as china clay, lithopone, barytes or similar substances may be incorporated with the mixture before the pressing operation. A suitable dye may be added to the material undergoing treatment either before or after the pressing process or both before and after.

When the nitrogenous material used is the scutch derived from degluing chrome leather it is first strained. Fifteen per centum of resin (such as colophony) calculated on the dried finished product is now mixed by kneading in a machine of known construction after which a sufficient quantity of alkali to saponify the resin is added.

The moisture content of the mixture should be about 30% according to the quality of the horn required. This proportion can be effected by pressing the scutch before the kneading operation as hereinbefore described.

A small quantity of acetic acid (varying from 1% to 5%) is now added to produce the desired suppleness of the mixture and to enable the desired proportion of the chromium content to be removed in the subsequent treatment.

Hardening

The mixture is now removed to a molding press of known construction in which it is subjected to a pressure of 200 to 600 atmospheres and a temperature gradually rising to 100° C. and then gradually falling.

When the molded material is in a suitable condition it is removed to a bath containing a 3% to 6% solution of formaldehyde in which it is allowed to remain until it is completely hardened. It is then removed, rinsed and slowly dried in air at a suitable temperature.

An artificial horn thus is produced.

In some cases calcium chloride or magnesium chloride may be used as a binder instead of saponified resin.

Obviously the degree of removal of the glue and gelatine during the degluing step will depend on several factors and may be more or less complete and the term "degluing" is used in the claim in this sense.

Silk As A Thermoplastic Material

Even the product of the lowly silk-worm must be counted among the protemoplastics---Process patented years ago may prove useful in light of present day knowledge

THE substance which constitutes natural silk is fifroin, a nitrogenous substance of a proteid nature while perhaps too expensive when used alone, we can see no reason why silk covered plastic molded buttons could not be made by this method.

WE seriously doubt if any of readers are aware of the fact that ordinary silk has properties that enable it to be used for *molding*. Yet, forty-four years ago a patent was actually granted on this idea.

On September 16, 1884, there issued U. S. P. 305240, to Charles S. Lockwood, of Albany, N. Y., who had assigned the patent to the Bonsilate Co., of the same city. This company was making various molded products, such as billiard balls, ivory substitutes, a form of pyroxylin plastics called "*Bonsilate*" and other similar material.

Lockwood describes the use of ordinary silk for producing molded products in heated presses, much in the same manner that resinoids are molded today. As an interesting historical fact, we believe that parts of this patent will make very interesting reading. It shows that many of the modern developments had their beginnings "way back when."

The patent is well written, and the language could hardly be improved upon. Here are some of the statements made:

"The invention is based upon the discovery that silk, in the form of a fabric or any other form, may be welded by heat and pressure. If the silk is in the form of a fabric, the effect of the application of the heat and pressure is to cause it to become compressed and solidified, at the same time producing, if the die or mold is properly polished, a very dense and glossy surface. When the invention is practiced in this way—that is to say, in connection with silk that has been made into a fabric—the result will probably be utilized chiefly in its application in the nature of a veneering, inlaying, facing, wrapping, or covering upon other materials for various purposes in the arts, as will be understood by persons conversant therewith. If preferred, the silk will be employed in other forms. It may be reduced to a flock or powder, or small pieces of thread and the like may be utilized, the precise shape or character of the particles being a matter of secondary importance.

"I have been able to produce particularly fine results with yellow silk from Naples, the formula of which is: fiber, 53.40; glue-yielding matter, 20.65; wax, resin, and fatty matter, 1 50; coloring matter, 0.05; albumen, 24.40.

"Finely-comminuted inert materials may, if desired, be added to the silk in suitable proportions.

"I contemplate especially the action of heat and pressure on silk when in the form of a fabric, in which I have been very successful. I have been able, also, to secure good results when the fabric has been only partially of silk. In practicing the invention I take any kind or quality of silk which I see fit and apply the heat and pressure in any desired way, not limiting myself to any particular method. I have obtained very satisfactory results by cutting a piece of silk of a size adapted to be pressed in a die having a polished surface or surfaces. The piece or blank of silk having been placed in the die, the die has been heated to a temperature due to about eighty pounds of steam, more or less, the pressure being about two tons to the square inch. By this means I have been enabled to completely transform the character of the silk, producing a compressed and solidified material quite unlike any other material of which I have a knowledge.

Ornamental Effects

"It will be found that if the silk be ornamented in any way the ornamentation will be preserved without appreciable injury, the compression being fully effected without impairing the finest lines or effects.

"In the employment of the silk with plastic material, the material may be placed in the lower section of a die or mold, and then a piece of silk of any

(*Continued on page 266*)

Rolling Pyroxylin Sheets Into Tubes

Simple Manner of Making Mottled and Duo-color Tubing Described

USUALLY, pyroxylin plastic tubing is made so that it is seamless, and in order to do this the plastic pyroxylin mass is usually extruded through a stuffing machine. This, however, produces a distinctive line of flow in the material, so that patterns are produced that reflect the method of production. It has long been desired to produce, in a simple and effective manner, tubes of pyroxylin plastic material that is originally cut from sheet stock, the sheets in turn having been cut from blocks. An entirely different kind of mottle can thus be made.

Often, a manufacturer may wish to produce a number of pyroxylin plastic tubes from sheet stock of definite design. This can be readily done, according to John N. Whitehouse, by winding a sheet of pyroxylin plastic, while immersed in a solvent which softens the sheet and renders it adhesive, about a mandrel.

Apparently the method was considered novel enough to induce the Patent Office to grant rather broad claims on this idea, for U. S. P. 1,661,451, from which this information is taken, covers:

"The method of forming tubing which comprises winding a sheet of material into a roll while immersed in a solvent bath," and, in the second claim applying this specifically to a sheet of celluloid. The third claim is perhaps even broader as it calls for "The method of forming tubing which comprises wrapping a sheet of material about a mandrel while immersed in a solvent bath." The solvent disclosed is acetone. The sheet is wrapped about a mandrel while dipping into the acetone, so that it becomes soft and flabby, and sufficiently adhesive that the several layers wound upon each other will adhere when dry. The mandrel and its burden of material is then set aside to dry, whereupon the mandrel is loosened and withdrawn. This is made easy by having the mandrel made of two bevelled pieces, which a blow will loosen and drive apart.

The patent also describes and claims a machine for the purpose.

Phenolic Products Co. Have New Sales Manager

Mr. Walter Newell, formerly of Allen & Hills and Chicago representative of the Auburn Button Works, has recently become sales manager for the Phenolic Products Co., of Rockford, Ill. This concern is equipped with some ultra-modern machinery and has a very large press, of 500 tons capacity. One of the well-known products manufactured by this company is the "San-Duro" toilet seat.

Henry Strutz

Mr. Henry Strutz, for many years in charge of the molding department of the Belden Company, at Chicago, died early in February after an illness of only a few days. Death was caused by a severe attack of intestinal influenza.

Mr. Strutz was well known among Chicago molders, and although only 29 years of age, had been with the Belden Company for a long time, and had worked his way up to a responsible position. He leaves a widow.

Camphor Notes

ACCORDING to Trade Commissioner, W. T. Daugherty, the Department of Commerce Berlin representative, an extraordinary general meeting recently approved the fusion of C. A. F. Kahlbaum Chemische Fabrik G. m. b. H., of Berlin, and Chemische Fabrik auf Aktien vormals E. Schering, Berlin, and the adoption of the company name, Schering-Kahlbaum A. G.

It was complained that camphor sales were unfavorable affected by competition and low prices. This refers, of course, to recent reductions in the price of the Japanese natural product. Schering, controlling Rheinische Kampferfabrik, of Duesseldorf, controls German synthetic camphor production. Some time ago, to meet the competition of synthetic camphor, the Taiwan Bureau of Monopolies announced a reduction of 15 per cent in the U. S. selling price.

Resinoids for Sand-Paper

It is quite generally known that the resinoids may be employed for the manufacture of molded abrasive wheels, but their use for the production of sand-paper is considered to be quite a novelty.

Armour & Co. are now producing a sand-paper in which in place of the glue usually employed, a soluble resinoid is used. This is of the Novolak type, being made from phenol and formaldehyde. The sand adheres better and there is less "gumming."

Durez in Demand

Ever since the first of the year, the large plant of General Plastics, Inc., at North Tonowanda, N. Y., where DUREZ is manufactured, has been compelled to operate on a 24 hour day basis in order to meet the rapidly increasing demand for the molding powders and impregnating resins made by this concern.

The immediate prospects are that this schedule will continue. as the great increase in demand for molded products provides a constant outlet for the material.

The "PROVING GROUNDS" *for* Celoron Quality

The Celoron laboratory, during the years that it has served the largest and oldest manufacturer of laminated technical materials in the country, has contributed more toward the development and maintenance of the outstandingly high, uniform quality of Celoron products than any other one department of the great Celoron plant.

New products, new methods, new standards of quality are almost everyday events in this modern, scientific "proving grounds".

It was here, in this laboratory, that Celoron Molding Powders were developed. Here, Celoron chemists, engineers and scientists labored patiently for a decade—perfecting, refining, testing—to at last be rewarded in the accomplishment of a product which they consider superior to any other molding powder that has been put on the market.

Because they believe that you will be interested in proving this fact to yourself, they offer you a sample quantity of Celoron Molding Powder for your own tests, in your own molds—side by side with the molding powders you are now using. Ask for it and for quotations. Judge for yourself.

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MOLDING POWDERS—IMPREGNATED FABRICS AND PAPER FOR MOLDING
Laminated Celoron sheets, rods, and tubes for Radio, Electrical, and Industrial Purposes. Celoron Silent Gears

Printing on the Pyroxylin Plastics

Penetration of the surface, polishing and pressing after printing, are the essential features of success in this old and useful art

By Carl Marx

ALTHOUGH we have not kept track of it, we believe that not a week goes by but that we receive a request from some place on the globe for a reliable method for printing on pyroxylin plastics. It would almost appear as though the method of so doing is a great interest to many of our readers, probably those who for the first time find themselves confronted with the problem. The present great increase in interest in the plastic materials undoubtedly brings a great many recruits into this field, and as definite knowledge on the methods of handling the plastic materials is not easily available, they naturally turn to such publications as our own periodical, Plastics, for information.

Inquiries from our readers have convinced us that we can render by publishing, from time to time, articles descriptive of the processes open to use by virtue of the expiration of patents. We present, therefore, the first of a series of articles along this line of thought.

Free to All

We have usually answered such inquiries directly by mail, but as they continue to come in, we believe that it would be very well to point out that printing on celluloid and kindred plastics is an old and venerable art. At one time it was still the subject matter of patents, and it is to those patents of the past forty years or so, that we can look for proper instructions. For it should be self-evident, that what worked forty years ago, will work just as well today. Another distinct advantage of following such an old method, is that there is no possibility of anyone coming along and demanding a royalty for its use, for these patents have expired many, many years ago. (The life of a United States patent is 17 years from the day of issue).

Lefferts and Hyatt

We are indebted to Mr. Marshall C. Lefferts and the originator of Celluloid, Mr. John W. Hyatt, for the first two patents to be reviewed, namely U. S. P. 348222 and 346376, both of 1886, and both assigned to the Celluloid Manufacturing Co., the predecessor of the Celluloid Company.

"The distinctive novelty of our process consists in subjecting the pyroxylin compound to the action of heat and pressure while in contact with the engraved plates, as hereinafter more fully described.

"In carrying out our process, it is desirable that the ink used be of such a nature that it will exert under heat and pressure a softening or penetrating action upon the pyroxylin surface, so that the coloring matter it contains will be forced into or effectually attached to the material. Any ink that contains a solvent of pyroxylin may be used, but we recommend the employment of an ink in which the coloring matter is in the form of a pigment and which also contains a binding agent for holding the particles of pigment together. The printing is performed by preference with an ordinary engraved plate and one having a highly-burnished surface, and we have found it is practicable to make use of plates in which the lines are of the most delicate character and also plates having plain surfaces, the design being transferred or applied thereto in any suitable manner. If an engraved plate is to be used it will be inked and made ready in any convenient way according to the method of the engraver's art, and, when desired, placed in contact with the pyroxylin surface to be printed and the latter subjected to heat and pressure, the heat to be from 180° to 230° Fahrenheit and the pressure sufficient to cause the material to flow into the engraved lines, which will be continued usually for about a minute, the heat and pressure being preferably applied to the material through the plate.

On Thin Sheets

"In printing upon sheets or other thin pieces of material we place the sheet to be treated in what is known as a "steam-table press" with the surface of the sheet that is to receive the impression in contact with the

(*Continued to page 267*)

TECHNICAL ABSTRACTS
AND PATENT REVIEW

Digest of Patents on Synthetic Resins other than Phenol Resins. Dr. Aladin, Kunststoffe, 1927, 17,278+.

This is the first installment of a chronological digest of patents in the field of synthetic resins other than then phenol-aldehyde resins, and is a further series to supplement the author's earlier digest on the phenol resinoids. It is stated to be a complete resume of the art, and hence of great value to searchers in this field. The German patents as well as U. S., British and French etc. are considered. The list is divided into 18 groups, and the total number of patents thus reviewed is 264. The list gives the patent number, patentee, general title of the invention and a concise resume of the process or product involved.

Starch Esters of Higher Fatty Acids, and Plastics made therefrom. Paul Berthon, U. S. P. 1,651,366; Dec. 6, 1927.

While starch esters of the lower fatty acids, such as starch acetate, are well known, the present process is aimed at the production of starch esters of the higher fatty acids such as starch palmitate and the like. The carbohydrate (starch) esters thus prepared are in the form of amorphous beads, uninflammable, soluble in a large variety of solvents, and in, particularly, cholroform, acetylene chlorides, carbon tetrachloride and benzene, toluene and the like. The solutions of these esters are perfectly clear and by evaporation will leave colorless, translucent and uninflammable pellicules. These properties enable the solutions to be employed either pure or mixed with cellulose esters in the manufacture of plastic materials, coatings and sizing, fabrics, films, etc.

The following example, given merely as an indication shows the process to be followed for the manufacture of palmitate of starch:

100 grams of dry starch are moistened with a mixture of 400 grams of benzene and 180 grams of pyridine; a mixture of 600 grams of palmityl chloride and 400 grams of benzene is added by portions; the heating follows for half an hour in the water bath at 60° with continual stirring. When the reaction is terminated the ester formed is precipitated by the addition of alcohol; then follows washing, drying, etc.

The palmitate of starch obtained, dissolved in benzene gives, by evaporation of the solvent, a colorless, translucent and uninflammable film.

The suitable apparatus are those now employed in the chemical industry.

Cellulose Ether Composition. Stewart J. Carroll, assignor to Eastman Kodak Co., U. S. P. 1,658,369; Feb. 7, 1928.

Cellulose ethers, such as ethyl cellulose are mixed with acetins, and worked up into films, plastic materials, etc.

In carrying out one embodiment of the invention, 100 parts of water-insoluble ethyl cellulose are dissolved along with from 5 to 50 parts of either mono, di, or tri acetin or a mixture of them (say 10 parts) in from 300 to 500 parts of a volatile common solvent. The latter may usefully comprise a mixture of methyl acetate and methyl alcohol, the weight of methyl acetate being approximately nine times the weight of the alcohol. This composition is suitable in a coating, from which the volatile solvent evaporates sufficiently to leave a transparent flexible sheet, which is stripped off and otherwise treated in the way well known in this art. The parts are by weight. This transparency and flexibility shows that the cellulose ether and the acetins remain in the colloidized state without precipitating each other.

Removing diphenylamine from smokeless powder to produce pyroxylin suitable for lacquer etc. John K. Speicher, assignor to Hercules Powder Co., Wilmington, Del., U. S. P. 1,653,519; Dec. 20, 1927.

The purpose of the invention is to remove from old smokeless powder, which is mainly cellulose nitrate, the stabilizing and modifying materials such as substituted ureas, diphenylamine and the like, so as to produce a pyroxylin suitable for making varnishes, plastics, etc.

The principle employed is as follows: the powder is dissolved in a solvent such as acetone, and the solution is then run as a fine stream or spray into a liquid that while miscible with the acetone, is a non-solvent of pyroxylin, but is a solvent of diphenylamine or other stabilizer that is to be removed. Preferably the non-solvent has a higher boiling point that the original solvent used to dissolve the pyroxylin,—for example toluene. The addition of the acetone solution of the smokeless powder to the toluene will precipitate the cellulose nitrate (pyroxylin) in a finely divided form, while whatever diphenylamine is present will remain dissolved in the toluene. The latter is then fractionated off. The pyroxylin is filtered from the toluene, and washed to remove the rest of diphenylamine. Various modifications, such as a continuous process, are described.

Low-viscosity Lacquer and film made therefrom. Edmund M. Flaherty, assignor to E. I. Du Pont de Nemours & Co., Wilmington, Del., U. S. P. Re-issue 16,803; (of U. S. P. 1,629,999; May 24, 1927.

The lacquer is made from the low-viscosity pyroxylin described in U. S. P. 1,636,319 to Earle C. Pitman. A strong solution of this pyroxylin, in amy acetate, amyl alcohol, acetone, toleuen, and alcohol, is employed; mixed with resins such as dammar, shellac, etc. Castor oil or other vegetable oils may also be added. The claims cover both the composition, expressed in terms of the viscosity in centipoises, as well as any "article covered with the composition." Claiming the article covered by what amounts to merely a superior form of pyroxylin lacquer, appears to be something rather broad and unusual.

Using Cold to Produce Cellulose Solutions. Leon Lilienfeld, Vienna, Austria. U. S. P. 1,658, 606; Feb. 7, 1928.

Cellulose, in any form, such as cotton, wood pulp or various intermediate products in the manufacture of viscose, are treated with sodium hydroxide solutions at temperatures around minus 8 degree centigrade. Clear solutions are said to be obtained, which are stable even at ordinary temperatures. These solutions, when spread on suitable surfaces, and treated with an acid to neutralize the alkali, will revert to a coherent and transparent film of cellulose, transparent and pliable. It is evident that a new principle of making cellulose solution has thus been found. Alkalies usually will not dissolve cellulose, but apparently when the solution is **cooled** such solution does take place. The process is said to be useful for making artificial silk, staple fiber, artificial hair, and obviously also for making transparent thin sheets.

Viscose Made in the Cold. Leon Lilienfeld, U. S. P. 1,658,607; Feb. 7, 1928.

The usual method of making viscose is modified by carrying out the process at below the freezing point of water. (See Patent 1,658,606, just preceding this abstract).

Molding Composition. Henry F. Albright, Jr., assignor to Western Electric Co. U. S. P. 1,659,936; Feb. 21, 1928.

Ordinary shellac molding compositions can be greatly improved as regards their resistance to mechanical shock by the addition of small amounts of smoked sheet rubber. A

composition thus made is suitable for making miniature lamp bases and for molding similar objects. A composition giving good results is made as follows:

8 per cent shellac, 21 per cent kauri gum, 55 per cent mica, 16 per cent vermillion, 3 per cent smoked sheet rubber, all thoroughly mixed and molded. This will stand striking with a hammer, can be worked with tools without cracking, and could even be worked on a lathe without chipping. Leaving out the rubber, with everything else the same, produces a composition which is completely shattered by a hammer blow.

Pyroxylin Composition Containing Dibutyl Mesotartrate. Charles Bogin, assignor to Commercial Solvents Corp., Terre Haute, Ind., U. S. P. 1,659,906; Feb. 21, 1928.

Dibutyl mesotartrate is employed as a **plasticizer** for cellulose nitrate or pyroxylin. A plastic mass is produced by mixing from 75% to as high as 300% of dibutyl mesotartrate to the pyroxylin, which is dissolved in only just enough acetone to produce a viscous semi-liquid mass. The solvent is then evaporated by passing the mass over heated rolls, etc. (In other words, **dibutyl mesotartrate** is a **camphor substitute**). Lacquers are made by similar methods.

Manufacture of Pure Urea. Leopold Bub, assignor to Interessengemeinschaft Farbenindustri A.-G., Germany, U. S. P. 1,659,190; Feb. 14, 1928.

Pure white urea, such as is required for the manufacture of transparent condensation products, is prepared from technical urea by oxidizing the same while in solution. For example a urea solution, such as is obtained in its manufacture, and which contains about 70% of urea and 1.5 per cent of ammonia, is oxidized by passing air through it. The air is introduced tangentially into the solution as a fine spray. Temperature used is 70 to 75°C. From 1½ to 2 hours suffice. The solution is then filtered while still hot, and a pure white urea will crystallize out on cooling or by evaporation.

Specific Gravity of Phenol Resinoids. Dr. C. Plonait, in Kunststoffe, 1927, 17,275.

Stirred into activity by apparently unfounded claims for the German resinoid "Juvelith" which claimed to have a specific gravity as low as 1.16, Dr. Plonait determined the specific gravities of a number of commercial clear phenol resinoids, with the following results:

Juvelith (6 different samples), from 1.259 to 1,269.

Dekorit (4 different samples) from 1.25 to 1,26.

Ambra (2 samples) 1.26 to 1.26.

Redmanol (2 samples) 1.25.

Resinoids Engage Attention of Inventors

Unprecedented activity in the field of synthetic resinoid materials by research workers in every civilized country augers well for the future of the plastic and moulding industries

By Carl Marx

ONE might almost be inclined to believe that the subject of the preparation of resinoids based upon the condensation of phenol with an aldehyde would have been exhausted by the present time, but it appears that inventors can still find methods that differ sufficiently from the prior art to allow them to obtain valid patent protection for the results of their efforts.

Beside the workers in pure research, who delves into the "reasons why", there stand the commercial research men, who, aided by Chemical Engineering translate the work of test-tube and flask into tons and dollars.

Industry needs them both!

Universal Interest

The efforts in this field are not by any means confined to one country, and the most recent patents that have issued show a great diversity of citizenship. Thus, in our present review, we mention the inventions of Germans, Canadians and Americans, although the latter has assigned his patent to a German corporation.

In the main, the processes about to be described are aimed at the lowering of costs and the production of more tractable products that lend themselves to commercial manufacture and produce more uniform products than those of the past, at least as far as the inyentors' statements are to be credited.

Meilach Melamid, of Freiburg, Germany, who already has a formidable number of patents in the line of resins to his credit, has just been granted a patent, U. S. P. 1,648,858, Nov. 8, 1927 on an invention that he applied for in Germany ten years ago (1918) and in the U. S. in 1920. It is evident from this patent, as well as from the others to be discussed below, that it is not a simple matter to get a patent allowed in this field, as most of them were in the Patent Office for quite a number of years.

Melamid, in the patent under discussion, prepared light colored high-melting point resinoids that have many of the desirable properties of the natural resins. This he accomplishes by condensing phenol with formaldehyde in the presence of sulfochlorides of the aromatic series, although he states that he may use phosgene or acetic anhydride with equally good results. The condensation is only carried to the soluble phenol-alcohol stages at first, and is completed in an alkaline medium.

Like Natural Resins

By using sulfochlorides of aromatic compounds which still contain carboxyl or hydroxyl groups or both, the capability of forming high molecular compounds is greatly increased, the products thus obtained being absolutely like natural resins. In carrying this method into effect the alcoholates are allowed to react upon the sulfochlorides containing carboxyl or hydroxyl groups in the presence of alkali, care being taken that at least one of the carboxyl or hydroxyl groups be present in the form of alkali metal salt, when the reaction is carried through; it being preferred to use some alkali in excess. The products obtained according to this process may be saponified and after saponification form soaplike substances adapted to foam and to form emulsions, such products lending themselves to the manufacture of solid lubricants from tar oils and the like and being similar or equal to natural resins or fats.

In the case where an anhydride of an organic acid, such as acetic anhydride is used white products resembling *celluloid* are obtained.

The products described above may be transformed into hard transparent substances having a higher melting point, by heating them in a vacuo preferably to temperatures exceeding 100 degr. C. To this end the products may either be heated directly or else they may be dissolved in a solvent and the solvent may then be distilled off, the residue being heated in vacuo.

Examples

Example 1.—100 grams of cresol alcohol obtained in some well known manner from commercial phenol (cresylic acid) are dissolved in dilute soda solution, the latter being a little in excess. A solution of 137 grams toluol sulfochloride in 500 grams benzol is then added and the

mixture is stirred several hours, the temperature not exceeding 30 degr. C. The benzol layer containing the product of the reaction is washed in order to remove the alkali which may be left and is then dried, whereupon the benzol is distilled off. The solid product thus obtained is hard and of a light yellow color and in all respects resembles a natural resin such as copal.

Other examples describe the reaction when phosgene, or when acetic anhydride is employed. The claims broadly cover the method which consists in reacting upon a phenolic body and an aldehyde with an aromatic sulfochloride and heating the body substantially in a vacuum.

Sulfuryl Chloride Used

The second patent is that of a Canadian, Howard W. Matheson, assignor to Canadian Electro Products Co., U. S. P. 1,653,302; Dec. 20, 1927 and covers a resinoid made from phenol, paraldehyde and sulfuryl chloride (SO_2C1_2) under pressure. The materials are placed cold into an autoclave and artificial pressure is applied by pumping in an inert gas such as nitrogen. The reaction starts spontaneously accompanied by generation of heat until the major portion of the reaction is complete. The material is finally heated to finish the reaction. The heating is not much above 80° C., however.

Other acid catalysts, such as halogen-oxy compounds of nonmetals, as phosphorus, acetyle chloride, benzyl chloride and the like may be used with equal effect; and even hydrochloric acid is suitable.

The resinoid produced is soluble but can be rendered insoluble and infusible in the usual manner. The patent also describes the preparation of a molding powder from this resinoid by incorporating wood flour with the same, either by impregnation or on rolls. The hard-

(*Continued on page 266*)

Silk as a Plastic

(*Continued from page 254*)

desirable form or design placed upon it, after which the whole is subjected to heat and pressure, the result being that the silk will be firmly combined with the plastic material, and if the piece of silk is smaller than the surface of the article to be produced it will be pressed into the material as an inlay. The silk becomes plastic and unites with the plastic material when under heat and pressure. Any desirable kinds of plastic materials may be made use of—such as *bonsilate* or *celluloid*.

"Any preferred color may be given to the silk prior to its being introduced into the die, according to the effect it is desired to produce and the uses to which the material is to be applied. The effect of the heat and pressure on the silk, besides agglutinating it, is to destroy the capillary attraction and make a waterproof material, and to render the fabric stiff and flexible. No difficulty will be experienced in molding the silk, under conditions which will effect its agglutination, into embossed and other shapes, as well as into sheets and bulk pieces.

Needless to say, here is a process that is open to any one, and if some of our modern producers of novelties can find use for this process, they are welcome to it.

Let Us Know!

If our readers evince an interest in hearing of old and half-forgotten processes, that nevertheless appear to be applicable to modern practice, and will tell us about it, we will be only too glad to inaugurate a new policy of bringing to their attention, every month or so, some patent or publication from the archives of the past.

As there never before has been a periodical, such as PLASTICS, that dealt with the problems of molding and of thermo-plastic materials in general, such publication of the older processes, for the benefit of the present generation, may prove valuable and instructive.

As it obviously requires considerable search in the older literature to unearth this material, we do not wish to undertake the proposition unless our readers unequivocally approve of this policy.

Letters from interested parties, and suggestions as to the type of material that might prove desirable, are cordially solicited.

Resinoids and Inventors

(*Continued from page 265*)

ening agents suggested for this resinoid are hexamethylentetramine, phenylenediamine, aldehyde-ammonia, furfuramid, ethylidene aniline or other acetaldehyde-aniline compound. The patentee points out the uses for the product, which include the impregnation of fabric, making of laminated products such as gears etc. The claims, essentially, cover the condensation of phenol and acetaldehyde with less than 1% of a condensing agent comprising a halogen derivatives of non-metal, under pressure at a temperature of about 50° to 80° C.

This review will be continued.

Fusing and Dissolving the "Infusible and Insoluble Resins" By Charles W. Rivise Starts in June.

Printing on Pyroxylin

(*Continued from page 260*)

ink-surface of the plate and apply the heat and pressure as aforesaid. If the sheet of material is exceptionally thin it will be desirable to back it up with a layer or layers of blotting-paper or other elastic material, for the purpose of preventing or correcting inaccuracies which are likely to be caused by any inequalities in the plate or the sheet, and to prevent the sheet from adhering to the backing a layer of any non-adhesive substance—such as metal or tin foil —may be interposed.

On Thick Sheets

"In treating thick sheets or pieces of material there is danger of the heat and pressure causing the material to flow, which will cause the impression to be blurred or distorted. This danger we obviate by using a die or mold which conforms in shape to the thick sheet or piece which is to receive the impression, in which the material is closely and compactly fitted, so that its shape will not be affected by the heat and pressure and the displacement of the surface to be printed upon prevented. Any die or mold which will prevent a change in the surface which carries the impression may be made use of.

"The printing may be accomplished in any other substantial manner, the essential consideration being the use of heat and pressure, substantially as hereinbefore described. By applying heat the surface of the pyroxylin compound is softened, and by means of the pressure exerted thereon the material is caused to flow into the engraved lines in the plate. By such means we are enabled to produce upon the material used results in every way equal to those produced upon paper."

The second patent, although the first in point of time, proceeds to describe a method in which the printed matter is first

Patent History of Gears

(*Continued from page 251*)

and the compression-sustaining means secured, the gear blank thus formed may be removed from the press and turned and milled according to the practice in making metallic gears.

2. Hess 1,085,420. Jan. 27, 1914.

The method of manufacturing silent gear wheels by assembling in line many laminae comprising non-metallic laminae alternated with periodic metallic laminae, excessively compressing them to force outwardly the non-metallic material beyond the metallic laminae, and securing the whole together to form the gear wheel.

3. Baekeland 1,160,364. Nov. 16, 1915.

A gear comprising a plurality of substantially parallel, spaced, perforated, metallic reinforcing-plates, in combination with a homogeneous and non-plastic body lying between said plates and interlocking through the perforations thereof, said body consisting essentially of a hard, infusible, insoluble, and non-plastic phenolic condensation product, compounded with a fibrous filling material. For certain purposes, it has been found desirable to incorporate with the composition, before hardening the same, a suitable proportion, as for example 10 per cent., by weight of the mass, of graphite. The graphite serves its usual function as a lubricant and enhances the smooth-running and noiseless character of the gear.

4. Conrad 1,167,742. Jan. 11, 1916.

A gear having a self-sustaining working body portion composed of laminations of a fibrous material and a phenolic condensation product. The material may be any suitable fabric such as paper, muslin, or other cloth, or fibrous or porous material of any kind. The fabric is first coated on one side, in any suitable manner, with an adhesive

liquid material, for example, preferably a phenolic condensation product such as Bakelite, which is a condensation product of phenols and formaldehyde. The paper is next dried by passing it over a series of rollers in a heated oven. The prepared paper is then cut into sheets of a convenient size. A plate is built up by placing the sheets together with the untreated side of the adjacent sheet, the number of sheets required for any given thickness having been previously determined. The built up plate is then placed between thin sheet steel plates and the assembled structure is placed between the platens of a hydraulic press which have been previously heated. Pressure is then applied and the plates are heated while in the press. The amount of pressure and the degree of heat applied may be varied in accordance with conditions. The effect of heating and pressing the plate is to firmly cement together the sheets of paper and to further impregnate the paper with the Bakelite. The plate is transformed into a hard, compact and coherent mass. After cooling, the plates of material are removed from the press and then clamped between steel plates to prevent warping during baking, which is the last step in the process. The plates are next placed in ovens and heat is applied for several hours, during which time any remaining moisture is expelled and the Bakelite is transformed into its solid, infusible and insoluble condition. The plates are then removed from the oven and the finished product is allowed to cool.

This review of the patent history of molded and laminated gears will be continued in our June issue with the further enumeration of details, and with many illustrations.

Large Press

(*Continued from page 251*)

apart. As the hydraulic cylinder and ram are built into each side of the retaining ring and the ram connected to the movable side plates with connecting rods, pressure may be applied to these four rams at once. With the application of this pressure, the four sides of the mold move outward simultaneously, away from the finished work.

The box is now ready to be raised out of the depth of the cavity. This is easily accomplished, as the bottom plate of the mold is connected with a hydraulic cylinder and ram which is built beneath the press. Pressure is then applied to this ram and the completed box is raised to the level of the top of the mold and may then be lifted off. The mold may then be returned to its former position, for molding again. To do this, pressure is released from the bottom ram and the side ram. The mold bottom and side plates are forced back to their erstwhile positions by spring action.

The height of this huge hydraulic press, with its pull-back ram extended, is 12 feet and 6 inches. The total floor space required for this press is 56 inches by 56 inches. The total weight of the press and battery box mold is approximately 12 tons.

A large number of these presses has been ordered by a well-known automobile manufacturing company which is planning to make its own battery boxes of Bakelite.

Mechanical Properties of Plastics

(*Continued from page 253*)

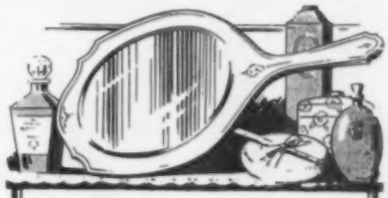
ical working. The knowledge thus gained is already being practically employed on a commercial scale in the manufacture of a certain kind of artificial stone, in which the "setting" of the material is produced

Accessories
For Toilet Articles

merely by powerful mechanical influences.

The following points may be considered as established:

1. Based on optical investigations, by a number of research workers, it has been shown that a number of plastic materials owe their plastic properties to their internal structure, which consists of a dispersed phase of individual minute particles having the form of either rods or plates, which are dispersed in a solid material. The plastic properties depend to a great degree upon the way these minute particles are oriented in the mass, and as to whether this orientation has been fixed in the finished article. The very decided fibrous structure exhibited by many of the colloidal substances, such as rubber, cellulose and the like may be explained by the formation of long chains of these minute oriented particles. This becomes more plainly evident when one considers the effects seen when rubber is calendered, and even more so in the case of casein solids plates, and still more so with naturally fibrous substances. The marked effect of the orientation of the particles is strikingly demonstrated by the remarkable differences in properties between clay articles that have been made by casting and those made by pugging and extrusion.



Factors in Plasticity

2. Plastification can therefore be defined as consisting, first, of a disaggregation or comminution, followed by a more or less complete reaggreation and orientation of the particles thus produced. The degree of dispersion as well as the completeness of the reaggregation are therefore decisive factors in determining the plastic properties of the final product.

As the disintegration is aimed at the production of particles

having a markedly linear shape, that is to say have one dimension considerably larger than the other, there is naturally a distinct limit to which the disintegration can be carried with profitable results. Inasmuch as the orientation is to take place with the formation of chains of rod-like particles, a too high state of disintegration will be fatal to useful plasticity. That this is so has been actually observed in practice, although a good explanation has hitherto been lacking. One striking demonstration of what happens when the grinding (disaggregation) has been carried too far is the "dead-milling" of rubber when worked on the calandering rolls. In some instances the mechanical disaggregation can be aided by the addition of chemicals, and sometimes these, while aiding the disintegration actually also prevent it from going too far by exerting an action like that of a protective colloid. Such an example is the effect observed when certain algae (seaweeds) are added to clays and kaolin.

3. The plastification of the various modern artificial horn and casein solids provides a particularly fertile field for proving the theories above explained, and makes it possible to test the results definitely and easily.

4. Based upon the actual data as to elasticity etc. of various casein solids, artificial resins and pyroxylin plastics, it has been shown that both mechanical and chemical agencies, **and each one alone,** as well as when acting concomitantly, exert a most marked effect upon the plastic properties of these materials, being a deciding factor in establishing the properties of the finished material.

5. The great similarity of the behavior of metals as well as non-metals as regards the changes in their properties allows us to conclude that the causes in both cases are not really different in principle, and that a careful study of the mechanical properties of both classes of materials, from standpoint explained in this article, will throw a great deal of light upon the plastification properties.

The definite application of the principles set forth in the article just concluded to the plastic properties of the various resinoids and artificial resins, forms the subject matter of the next article in the present series by the authors, Manfred and Obrist.

A careful reading of this fundamental research, will undoubtedly materially assist those who are engaged in the development and improvement of our present plastic materials; for it is only by the application of scientific priciples that genuine progress, along definite and established lines, can be realized.

Printing on Pyroxylin Plastics

(*Continued from page 267*)

applied to the plastic, after which the same is subjected to heat and pressure. This method is still followed to this day.

This patent says, among other things, that:

"To illustrate and explain my process, I will first describe the treatment of a piece of material in the form of a thin sheet.

"Having applied the design to the sheet, by means of a press or otherwise, I place the sheet bearing the impression in what is known as a "steam-table press," with the printed face of the sheet in contact with a polished plate or surface. Arranged in this way, the sheet and the impression it bears are subjected to the proper degree of heat and pressure—say from one hundred and eighty (180) to two hundred and thirty (230) degrees Fahrenheit—for about a minute, the pressure being about six hundred pounds to the square inch. In working sheets of the thickness of one sixteenth of an inch, or of greater thickness, the pressure will not be so great, only that degree of pressure being required which may be necessary to flow the surface of the sheet and effect a satisfactory impression. If the sheet is thin, it will be desirable to back it up with a layer or layers of blotting-paper or other elastic material, for the purpose of preventing or correcting inaccuracies and defects, which are likely to be caused by any inequality or irregularity in the plate or sheet. To prevent the sheet from adhering to the backing, a layer of any non-adhesive substance — such as metal, tin-foil, or celluloid— which has been properly oiled or lubricated may be interposed.

"If desired to import a finished or calendered surface to both sides of the sheet, the desired object may be accomplished by a sheet of polished metal, which will be placed in contact with the reverse side of the sheet of celluloid.

Printing Thick Stock

"In treating thick pieces of material there is danger of the heat and pressure causing the material to flow, whereby the impression will be blurred or distorted. This danger I obviate by performing the operation in a die or receptacle in which the material is so closely and compactly fitted that its shape is preserved, and any displacement of the decorated surface thus prevented. Any die or mold which will prevent a change in the surface that carries the impression may be made use of.

"My process is useful in connection with all kinds of printing, and in using the word "design" I intend to include every species of impression, simple or complex, in the whole range of the printer's art. Inks of different kinds may be used. The only requirement is that the ink shall be of such a nature that a sharply-defined impression can

be produced, and of such strength or density that a small quantity only is necessarily used to give the desired impression. Inks which spread easily, or which require to be used freely, are not desirable. I have found that excellent results may be obtained with aniline ink, such as is used for rubber stamps in office work. I do not, however, confine myself to the use of an ink of any particular kind; nor do I limit my claim to any particular method of printing; nor to the use of plates, types, or stamps of any particular kind. The nature of the ink and manner of causing the application of the design may be greatly varied, according to circumstances and the results that are desired."

Several other processes for producing printed designs on the pyroxylin plastics will be taken up in a continuation of this article.

Fred C. Meacham Goes with Northern Industrial Chemical Co.

AS of May 1st, 1928, Mr. Fred C. Meacham will represent the Northern Industrial Chemical Company in an engineering and sales capacity with an office in New York City.

Mr. Meacham has been in the molding business since 1914, when he started with the Mineralized Rubber Co. of Newark, N. J., as factory manager. He left them in 1917 to go with the National Lead Co. of New York and started them on phenolic resinoid molding work.

Mr. Meacham had entire charge of this work, both sales and operating, for National Lead Co. until late in 1926, when they decided to give up their specialty departments and the business was sold out.

After that he was assigned to various engineering investigations for the National Lead Co. and has just completed the consolidation and moving to New Haven, Conn., of the Die Casting Division of the National Lead Co. and the Marf Machine & Die Casting Co. of Brooklyn, N. Y., which is now being operated under the name of The Newton Die Casting Corp. This assignment being completed, Mr. Meacham was free to go to his present connection.

The Celoron Company represented by Ralph W. Wales

RALPH W. WALES

THE Celoron Company, (Division of the Diamond State Fibre Company) Bridgeport, Pa., in conjunction with the opening of its new laboratory, and the introduction to the electrical, radio and automotive fields of Celoron molding compounds, announces the appointment of Mr. R. W. Wales as factory representative on molding powders and resins.

This announcement is made by Mr. T. E. Webster, Vice President in Charge of Sales.

Mr. R. W. Wales enjoys a background of many years of experience in the developing and manufacture of molding compounds, having been connected with one of the largest manufacturers of this material for fifteen years.

His association with the Celoron Company should prove to be a forerunner of important announcements of interest to all molders.

General Plastics Expands Their Plant

General Plastics, Inc., manufacturers of Durez molding compound and insulating varnishes, are building another addition to their plant at North Tonawanda, New York.

During nineteen twenty-seven, the plant was enlarged by the construction of the new resin room, making the new addition the second enlargement of the plant since it started operation a year ago last September.

General Plastics' first addition was completed last summer and was erected to care for the manufacture of their special materials, the original plant being entirely occupied with the manufacture of standard molding compound.

During nineteen twenty-seven, the plant was enlarged by the construction of a new resin room. This new space provides facilities for an increase of practically fifty percent in production. During nineteen twenty-eight it is planned to enlarge the plant still further by the erection of two new warehouses immediately adjoining the main building—these to be used for the storage of raw materials.

MOLDED PRODUCTS

Devoted to the purchase, further use and merchandising of all manner of molded parts

Vol. 2 MAY, 1928 No. 5

Molded Products Helps Make Coal Mines Safe

Molded housing on this safety lamp prevents chance of short in electrical current

By J. A. Maguire

To those who have ever had the experience of a trip through a coal mine, the need of a dependable light will be obvious. In quite a percentage of the mines today, the old type of carbide cap lamps are in use.

This lamp is constructed somewhat along the lines of the old bicycle lamp in use some years ago. It has the chamber for carbide and container for water. The gas formed by the water's contact with the carbide escapes through a small pin hole in the middle of the reflector. This gas is ignited by a spark and burns in the open.

This type of open flame lamp is in general use in a great many mining sections. However, in coal fields where gas is encountered, safety lamps have been in use for some time. This is necessary since the old open flame lamp is very dangerous. This is due to the fact that there is always danger that the open flame will ignite the gas or finely pulverized coal dust floating in the air.

Safety Lamps

Various types of safety lamps have been made and one of the outstanding models is the one manufactured by the Edison Storage Battery Co. This lamp uses an electric bulb, power for which is supplied by small batteries carried in the box shown in the small illustration.

Safety Lamp with Battery Box

The current from the batteries is carried to the lamp proper by insulated wires. Metal was formerly used in making the lamp housing. This entailed machining, threading, drilling and finishing operations. In addition to this, the electrical parts within the housing had to be insulated from the metal shell.

Housing Molded

This housing is now being molded in one piece. The job is interesting on account of the complicated shape of the article as well as on account of its fitness from other angles.

The job comes from the molds as shown in the larger illus-

tration, finished in one operation. It is necessary to have threads molded in two places. The larger end having male or outside threading, while the smaller end has female threads.

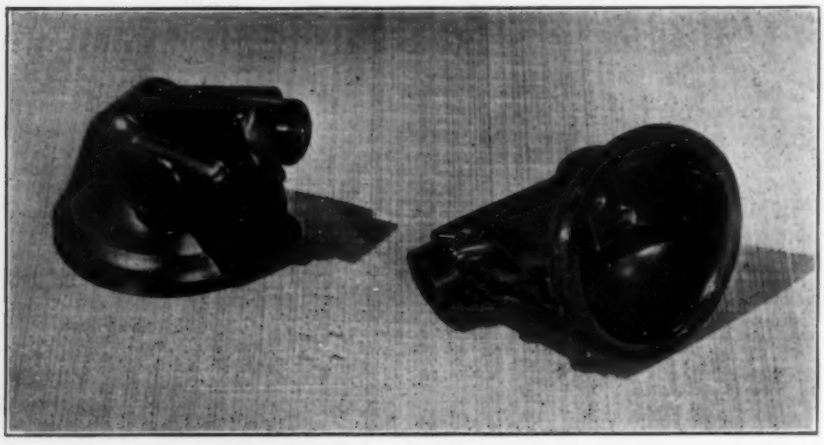
In addition, there are several metal inserts all imbedded at the time the piece is molded as well as all necessary holes for wiring, etc.

No insulation is needed to prevent contact between housing and electrical parts as the housing itself is formed of insulating material. Of course, the completed job needs no buffing or enameling, as it comes from the mold with a perfect surface lustre.

Another thing to be taken into consideration is the fact that the material is not affected by moisture. Coal mines are naturally damp. Phenolic resinoids are not affected in any way by moisture, so that this makes one more point in favor of a molded job.

When one considers that one of the main ingredients of phenolic resinoid materials is derived from coal, there is a certain fitness regarding its use in helping produce its own raw material.

This job is being done with Bakelite by the Edison Storage Battery Co., Orange, New Jersey.



Two views of molded housing of Edison Safety Lamp.

New Form of Radio Tube Described

While this inventor had glass in mind there is no reason why some one of the molded plastics could not be used

The object of this invention is to cut down on the amount of operations and labor necessary with the present methods of manufacture by providing a new and simpler method of manufacture, thereby cutting down on the cost of making vacuum tubes. Another object is to provide a tube which is rigid and of durable construction thereby adding to the life and use of the tube. Another object is to provide a tube which is non-microphonic. Also a common molded base and container.

The custom at present and in the past has been to manufacture vacuum tubes by welding together the container and a stem or support of previously shaped glass and then extracting the air by means of a glass tube extension which is sealed after the air has been extracted.

There are many disadvantages to this method of manufacture as follows:

In the first place, the whole procedure of the present method of manufacture is a very delicate and ticklish procedure requiring skilled glass blowers and other workmen and very elaborate and complicated machinery and with all of this the tube produced is delicate, fragile, and microphonic.

It is delicate and fragile because it is made of welded parts of thin tubular glass.

It is microphonic because the thin glass can easily vibrate in accordance with air waves and other vibrations. It cannot well be made thicker because of the difficulties arising in the welding of thick glass, etc.

In order to eliminate the above mentioned disadvantages and many other lesser disadvantages which are not mentioned I have provided the following method of manufacture.

The idea is to first prepare the elements such as filament, grid, plate, etc., in their proper relative positions and using a convex metal form or mould for instance, to surround them, for example, a bell shaped screening.

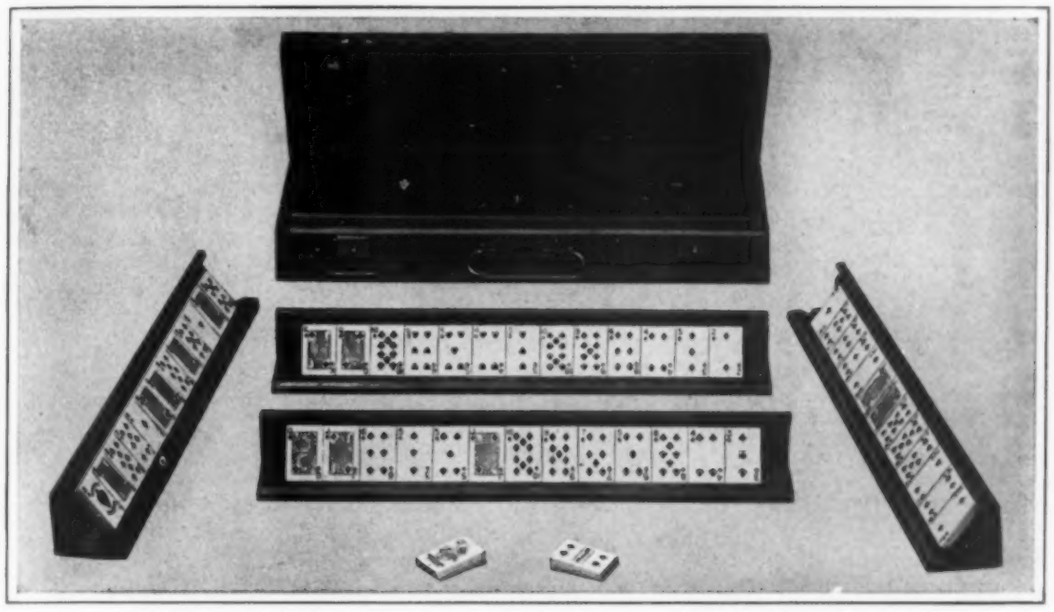
This form or mould may be the plate or it may be a separate form or mould outside of the plate. The object is to provide a form or mould to support molten glass or similar molten substance around the elements.

Now the assembled elements including the aforesaid form are placed in a large concave mould which is used for moulding the outside shape of the vacuum tube. The leads from the elements may extend through the bottom of the mould. At the base of the elements a partition of insulative material for instance, a disc of mica may be used to prevent the molten glass from reaching and destroying the elements.

Metal contact prongs such as are found at the base of tubes at present, may extend into the mould slightly.

In addition and of special note, is the use of a thin, hollow wire of, for instance, combined metallic alloy, used to extend

(*Continued to page 289*)



The Pyralin card tiles all ready for a game, and the compact case in which they may be carried

Let's Play Bridge

Pyroxylin tiles take the place of cards in this new game set

By W. D. Maginnes

UNTIL recently variety in playing cards has been confined to the varying forms of design upon the back. Within the past year, we have seen cards printed on black backgrounds instead of white. But here we have something entirely new in shape. Tiles similar to domino or Mah Jong tiles should prove a new and fascinating method of playing the age old games.

These tiles should become very popular during the vacation period when the game is *played in the outdoors, on the porch or lawn.*

BRIDGE has become so popular during the past few years that practically every one either plays the game or at least knows enough about it to make a passable fourth hand in an an emergency. And now there is a new way to play it without the use of cards.

One of the oldest devices used in games—tiles like those for Mah Jong—has been adapted for bridge by the Ivorytone Products Corporation of Long Island City, New York. Fifty-two tiles, corresponding to a deck of cards, with a joker and dealer, are embossed and beautifully hand colored, and those who have played with them declare that the game is far more fascinating than when regular cards are used.

Demand Good

Last year, just before Christmas, a limited number of these card tile sets was put on the market in a few of the more exclusive New York shops. The idea took hold immediately. Many of these sets were purchased by some of the most fashionable families in the East, and with this sanction of society leaders, the demand soon outran the supply, so that only recently has the manufacturer been able to make enough sets for general distribution.

After making a complete survey of all suitable materials for making card tiles, the manufacturer selected pyroxylin plastics, because it can be fabricated and embossed easily; it holds its beautiful luster and polish a long time, and its uniform strength and durability prevent the corners of the tiles from chipping even when subjected to rough handling.

While a majority of sets today are being made of white Ivory color, the manufacturer has at his disposal a wide range of colors in pyroxylin sheeting, and this is a point of special advantage, considering the trend today is toward making products of all kinds more colorful.

There are no changes in rules

(*Continued to page 288*)

Molded Gear Shift Balls Coming to Front

Gear shift balls of phenolic resinoid molding materials and pyroxylin plastics add color and utility to present day automobile

TO compare the present day motor car with the car of a few years back from the standpoint of color is like a comparison between the peacock and a crow. A few years ago practically all cars were painted either black or dark blue. But with the advent of the pyroxylin type lacquers all this has been changed.

And with the advent of color for the outside of the car, there has been a decided change in the interior. Some will say this is an appeal to the feminine eye. Be that as it may, what used to look like the cab of a locomotive or the interior of an engine room, has taken on a decidedly different appearance.

Gear shift balls is one point in which there has been a vast improvement in appearance. Probably the first departure from the old type of ball was the onyx ball. While by itself this is a very neat and attractive article, it did not blend in with the rest of the interior fittings.

Hard Rubber Used

Then we have the gear shift ball made of hard rubber and of any of the various molding compounds. If made of any of the various phenolic resinoid group, these balls have a very high lustre. However, up until recently, they have usually been made only in black.

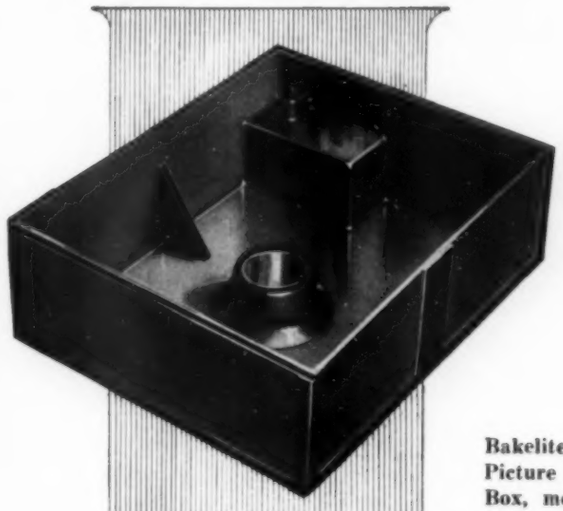
A new ball has recently come to our attention, which goes one step more in producing a real appearance of richness to car interiors. That is the ball shown in the illustration. This ball is molded from phenolic resinoid material in black or mottled brown mahogany color in the convenient mushroom shape that fits the grip. In addition to the fine finish, there is a beautiful silver initial embedded in the top of the ball. This gives the ball, not only a good appearance, but lends an air of distinction to the interior of the car.

For some time now, there has also been made gear shift balls

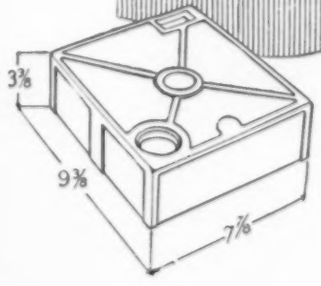
(*Continued to page 293*)

Cut furnished through courtesy Dayton Automotive Products Co.

PLASTIC MOLDING



Bakelite Motion Picture Camera Box, moulded by Shaw



IF YOUR JOB is one that requires expert craftsmanship, if your molded parts must be perfectly made and finished to the highest degree of accuracy, it will pay you to consult Shaw.

In other words, if your first consideration is to procure quality molding you need a quality molder.

Producers of the finest in moulded parts for thirty-five years.

SHAW INSULATOR CO.

IRVINGTON, NEW JERSEY

Established SHAW 1892

Accurate Setting of Metal Inserts a Big Factor in Molded Products

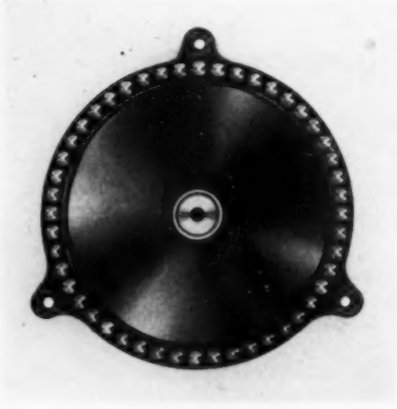
The ability of the molder to accuratedly set metal inserts is responsible for securing many orders

THERE is one big sales argument for the use of molded parts on which it is impossible to lay too much stress. That is the accuracy with which it is possible to mold metal inserts directly into the part without additional machine work. It would seem sometimes that we were talking about this feature entirely too much. However, this subject is so important from the standpoint of the buyer of molded parts that its advantage cannot be brought out too strongly.

In the illustration is shown a molded part in which is set forty-eight inserts. These inserts are all spaced the same distance apart and must be held to a very close tolerance.

It does not need much experience in production to see the benefits to be derived from being able to have these inserts imbedded in the part at the time it is molded. If this were not possible, it would mean that on this particular piece if any other type of material were used, forty-eight holes would have to be drilled and tapped in order to set the inserts in place. This would be an expensive operation, even if accuracy as to distance were not required. But if the job were to be turned out in its present form, the labor charges would be prohibitive.

This molded part is part of the mechanism of the Dris-Call System, automatic calling device invented by D. W. Driscoll of the Villanova College School of Technology.



Showing Metal Inserts in Dris-Call part

This device is designed for use in hotels, boarding school dormitories, institutions, homes, etc. It is designed to take the place of the usual "Call for seven please" order placed at the desk before turning in for the night.

Built In

The device is stationary, being built in the wall of the room. It requires no winding, is perfectly noiseless, except when it is called upon to be otherwise. It is operated by electricity and resembles the panel board of a one tube radio set. only it is smaller. And instead of the semi-circle wave length dial, it has the complete circle which forms the hours of the day marked off into quarters.

To set the apparatus, it is only necessary to turn the dial pointer to the exact time call is desired, the mechanism will do the rest. To stop it, there is a switch provided similar to the switch on your radio set.

There is no doubt that this device should find a ready market, particularly in the better class hotels, as well as in boarding schools, etc.

Close Tolerance

The very fact that it is possible for the molder to turn out work with metal inserts held to such close tolerance, often times results in such devices being saleable. If it were necessary to use some other material on which drilling, tapping, soldering, etc., entered in, the resultant labor charges would in some cases make costs so high as to effectually kill the sale.

This is where inserts play such a large part in getting business for the molder. The work is done more accurately than if done by other methods. The insert is set in such a manner as to prevent its coming loose. And finally the total cost is reduced.

This particular job is being done for The Cleverly Electrical Works by The Scranton Button Company.

New Socket Makes Use of Molding Compounds for Rapid Assembling

Contact points all molded into newly patented socket makes assembling easy

THIS invention relates to electric lamp sockets of the type composed of separable body and cap portions, and has for its object to provide simple positive means for locking the body and cap portions in assembled relation while permitting speedy disassembly when desired.

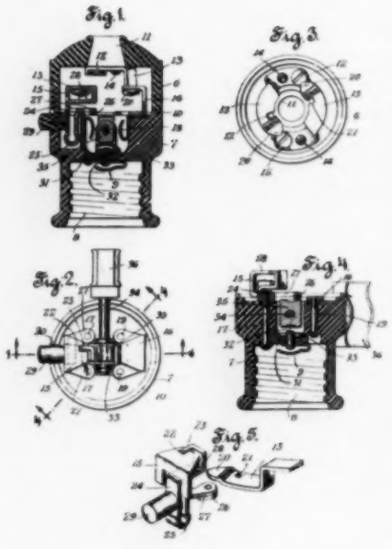
Fig. 1 is a longitudinal section on the line 1—1 of Fig. 2 showing the parts in assembled relation.

Fig. 2 is a plan view of the body portion, the cap being removed.

Fig. 3 is a view showing the interior of the cap member.

Fig. 4 is a section of the body portion only taken on the line 4—4 of Fig. 2, and

Fig. 5 is a perspective view of the locking mechanism.



The socket consists in general of a cap 6 and a separate body 7 of suitable insulating material. The cap 6 has the usual central aperture 11 to accommodate the end of a lamp cord, the individual conductors of which may be secured by binding screws 12 to two oppositely disposed hook shaped terminals 13 which are held in place with the cap as by screws 14.

Molded within the neck portion of the body is a metal screw shell or contact 8 adapted to receive a lamp or attachment plug, while a central contact 9 is also provided as is usual. The meeting edges of the cap and body are grooved as at 10 to provide mutually engaging shoulders which prevent relative translational movement when the parts are assembled. On opposite sides of the face of the body are two yoke shaped contacts 15 and 16. Yoke 15 is held in place and connected to screw shell 8 by two screws 17 (Fig. 4) while yoke 16 is held against a spring contact 18 set in a shallow recess on the face of the body by two screws 19 whose heads are countersunk so as to be insulated from the lamp contacts. The relative position of the yokes 15 and 16 on the body and hooks 13 on the cap is such as to permit the parts to be assembled by bringing them together with the free portions of the yokes just to the left of the downwardly bent toes 20 of hooks 13. A clockwise turn of the body relative to the cap will then cause each hook to ride under and engage the lower surface of the free portion of its adjacent yoke, and the parts will be firmly held in assembled relation.

In order that the cap and body may not be accidentally disassembled, the inner edge of each hook 13 is notched as at 21, and also notch the inner edge of the free portion of yoke 15 as at 22. The notches on yoke and hook are arranged to be in registry when the parts are assembled, regardless of which of the two hooks 13 yoke 15 engages. To lock the yoke and hook in engagement I provide a catch 23 which is normally held within the notch 22 of yoke 15 by a spring member 24. This spring may be of any suitable type but most desirably comprises a bow portion 25 terminating in two feet 26. These feet are of the same shape as the feet 27 of yoke 15, and each has a hole registering with the tapped hole in the corresponding foot 27 which accommodates one of the fastening screws 17. The face of the body of the socket is recessed near one edge to receive the bow portion 25 of spring 24. The back or web portion of yoke 15 is cut away (see Fig. 5) to permit the passage there-through of an arm 28 extending inwardly from the outer end of bow 25. Catch 23 is most conveniently formed integral with its carrying spring 24 by turning upwardly the

(*Continued to page 284*)

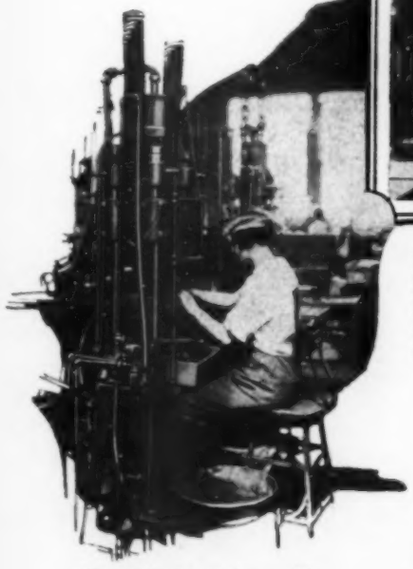
This Mass Production Means Lower Costs

The facilities of G-E molding plants, which have produced millions of Textolite Molded parts for use in G-E products, are now available to the entire industry.

Careful research, the best of materials, and skilled design combine to produce superior molded parts at low cost. Five years of experience, in which G-E made more than 375,000,000 pieces, have brought production methods to highest efficiency. The resources of General Electric make these plants a dependable source of a high-grade product.

If you need custom-molded parts of proved reliability and economy, telephone your nearest G-E office.

A production aisle in the hot-molded department. Note that the most modern equipment is used to decrease manufacturing costs by scientific mass production



This trained operator molds thousands of intricate pieces every day. Hundreds of such operators are needed to meet the demand for G-E Textolite Molded

An aisle in the cleaning department. After cleaning, the beautiful polished pieces are ready for packing

GE Textolite Molded

885-12

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

New Socket Makes Use Molding Compounds

(*Continued from page 282*)

inner end of arm 28 thereof, and then bending outwardly one edge of the upturned portion, as shown in Fig. 5. The spring and catch are secured to the body beneath the foot of yoke 15 by the same screws 17 which hold yoke 15.

The ends 20 of hooks 13 are rounded, so that as the body is rotated relative to the cap in assembling the parts the inner edge of the hook end 20 will engage the outer vertical edge of catch 23 to gradually force the catch inward until hook notch 21 registers with yoke notch 22 at which time spring 24 snaps the catch into the notches and locks the parts against further rotation. In order to permit removal of the body from the cap after the parts have been once assembled, a button 29 is fastened to the outer arm of bow 25 of spring 24, and provide a slot 30 in the body through which the button extends. Thus by pressure on button 29 the catch may be moved inwardly out of the notches 21 and 22 in the hook and yoke, and the body may then be separated from the cap by counter-clockwise rotation relative thereto.

Contact

From the foregoing it is obvious that screw shell 8 is in electrical contact with one conductor of the lamp cord when the parts are assembled, the circuit being traced through a binding screw 12, hook 13, yoke 15 and screws 17. Yoke 16 is similarly connected to the other conductor of the lamp cord. Center lamp contact 9 may be permanently connected to yoke 16, but preferably interpose a switch of any suitable type between these parts. In the present embodiment is provided a cup shaped depression in the face of the socket body to house the switch, which is of the simple snap type. Along the bottom of the depression and extending up one side thereof is a double spring contact 31 (Fig. 1) which is held in place and connected to central contact 9 by a screw 32. To the same screw is secured a U-shaped bracket 33. Journalled in said bracket is a stem 34 carrying at its inner end a rectangular conducting block 35 and at its outer end a key 36, both secured for rotation with said stem. When the switch is in its off position (shown in the drawings) the concave end of block 35 rests on the lower bow of spring contact 31, whose pressure is sufficient to prevent rattling. To turn on the switch, the key is turned through a right angle, at which time block 35 connects the upper bow of spring contact 31 to spring 18 and thus completes the connection between center lamp contact 9 and one conductor of the lamp cord. In this position also the pressure of the contact springs on block 35 prevents rattling of the switch.

This invention thus provides a two part lamp socket of insulating material to which all the conducting parts are secured, and which may be easily and quickly assembled, the cap may be quickly removed from the body to connect a lamp cord or for any other purpose, but when secured to the body is positively locked against accidental separation therefrom.

The claims for this are:

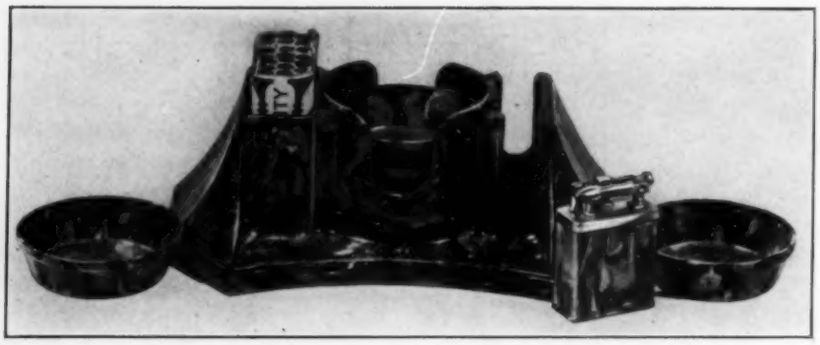
1. A lamp socket comprising a cap having two circumferentially extending hook-like conducting members, a body having cooperating hook-like conducting members adapted to be assembled with the cap by a longitudinal and rotary movement of the body with respect to the cap, a screw socket electrically connected to one of the latter mentioned hook-like members, a center lamp contact, a double spring contact having one part electrically connected to said center lamp contact, a contact disposed opposite another part of said double spring contact and connected to the other of said latter mentioned hook-like members and a rotatable switch member coacting with said double spring contact and said opposite contact.

2. In a lamp socket the combination with an insulating cap containing two symmetrically disposed notched metallic hooks, of an insulating body having two metallic yokes adapted to be rotated into engagement with said hooks, one of said yokes having a notch in registry with the hook notch when said parts are in engagement, a catch arranged to enter said notches to lock the parts in engagement, a spring to press the catch into the notches, and a button extending without the socket to move the catch out of the notches to permit disengagement of the parts.

Screw Contact

3. In a lamp socket, the combination with an insulating cap containing two oppositely disposed notched conducting hooks, of an insulating body having at one end a screw contact and a central contact to cooperate with a lamp and at the opposite end being cupped out to receive spring contacts and a switch member, a yoke shaped contact secured to the face of the body and connected to one of said lamp contacts, the free portion of said yoke being adapted to interlock with either of said cap hooks to fasten together the body and the cap and having a notch to register with the hook notch when interlocked

(*Continued to page 292*)



Color Appeal in New Smoking Sets

New smoking stand in striking colors contains pocket type lighter, six trays and cigarette container

COLOR is the dominant note in the field of modern merchandising. No longer is it possible to sell an article merely on its utility value alone. Manufacturers who are taking advantage of this trend are the ones who are enjoying the greatest volumn of sales.

This was illustrated a few years back when some of the fountain pen manufacturers came out with a line of colored pens. How many of the old type black pens do you see today on the market? At first it was said that the colored pens were too flashy but nevertheless the old black pen is definitely in the discard.

And if this urge for color is so pronounced in the fountain pen field it is even stronger in any line that pertains to house furnishings. How many men remember the arguments that were raised when radio was still in its infancy. Their wives absolutely refused to allow their living rooms to take on the appearance of workshops with the type of radios then in use. The radio manufacturers realized this drawback to the sale of their product and now the present day radio has taken on the dress of a fine piece of furniture.

Articles for use of the smoker have long been made of phenolic resinoid powders. Pipe bits and cigarette holders have been in use now for years. Then came the ash tray of molded material to take the place of metal. Its use for this purpose has grown by leaps and bounds due not alone to the fact that it is so easily cleaned, but also to the color range that this type of material gives.

Completely Molded

The illustration shows a complete smoking set of molded material made by the Schneider Electric and Manufacturing Co., of Chicago, Ill. This set is molded entirely of phenolic resinoid powder. The body of the set which is molded in one piece contains spaces for cigarettes, six trays and a lighter. This lighter the body of which is molded is the same type of lighter that has enjoying such a large sale lately. The trays when not in use are nested in the main body of the stand.

The entire set which is made in a variety of colors to suit the individual taste is a very attractive article and would make a welcome addition to any library table as well as to any office desk. The set illustrated is in a mottled color.

It is articles such a these that are bringing such a large demand for molded products. Not only do they themselves account for a large volumn of business to the molder and the manufacturer of molding compounds but the very fact that they get into the hands of so many people who have never had any contact with molded products in a commercial way is a big sales help.

Seeing such an article as this turned out in the manner in which it is will provoke curiosity in the minds of many as to whether or not some article which they are interested in can not be made in a similar manner.

New and Novel Socket

THE illustration shows something new in the way of multiple outlet plugs. This plug is designed as a four outlet to be used either connected direct to the base outlet or for use on the table or desk.

When connected direct to the base outlet, the Foursome is designed so that the top may be removed from the lower part and inserted in the wall outlet by itself. It then becomes a four outlet plug.

When used for the table, the entire Foursome is used. It is 3½ inches in diameter and 1¾ inches high and supplied with six foot of silk covered cord and plug to fit any standard socket.

Handy for Table

When used in this manner, it can be plugged in at the wall socket and there is enough cord to allow the Foursome to be placed on the table. At the breakfast table this arrangement comes in handy as the multiple outlets make it possible to connect the coffee percolater, toaster, electric grill, etc., all at the same time and saves many a step on a busy morning.

The device also has its uses for the living room, library, and other rooms as well as about the office.

(*Continued to page 288*)

Combined with its utility and following the modern trend, the Foursome is made in a variety of colors to suit the most exacting tastes. It is made in black, mahogany, walnut, onyx, red and green. There is a sunken design in the top which adds to the general good looks of the article.

This article is being manufactured and marketed by Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.

Death Claims Marshall C. Lefferts Former President of Celluloid Company

Marshall C. Lefferts, a prominent figure in the celluloid industry for many years, died April 30th at his home, 45 Park Ave., New York.

Mr. Lefferts was seventy-nine years old. For more than fifty-three years of his life he was connected with the Celluloid Company.

He went with the company in 1871 as secretary and treasurer. His father was one of the founders of the business. Mr. Lefferts became president of the Company in 1890, and was connected with it until his retirement last year as chairman of the board.

Mr. Lefferts leaves a son, Marshall C. Jr., and a daughter, Mrs. Henry Rawle.

Let's Play Bridge

(*Continued from page 277*)

when playing bridge with card tiles. They are shuffled face down and dealt in the usual manner. Each player arranges his "hand" on a rack which conceals the pieces from the view of other participants. As the illustration indicates, the players have complete freedom of the hands throughout the game. The tiles are much more satisfactory than cards for playing in the open, as on the lawn, porch or on board a yacht, for

the wind cannot cause confusion by turning them face upwards.

Playing bridge with card tiles is practical and interesting, as well as new. It is certain that the novelty of playing by this method will appeal strongly to many devotees of the game.

Additional information about these game sets can be obtained by writing to the Du Pont Viscoloid Company, 330 Fifth Avenue, New York City.

Reprinted From DuPont Magazine for April 1928

New Form Radio Tube

(*Continued from page 276*)

from within the tube through the wall of the tube to the outside, for the purpose of extracting the air and creating the necessary vacuum therein. This hollow wire may be individual or it may be one of the leads to the elements if desired.

After the elements, bell shaped mould, and the hollow wire are in the proper position in the concave exterior mould, molten glass or other suitable material at the proper temperature is poured in and allowed to cool off at the proper rate to prevent cracking, etc.

It should be noted that the bell shaped mould and the disc at the base thereof provide a form for the molten glass poured thereabout thereby maintaining the space within, which, later, when the air is extracted, becomes the vacuum chamber of the vacuum tube.

The exterior or concave mould acts as a support for the elements, leads, bell shaped mould, hollow wire, etc., and forms the exterior contour of the vacuum tube.

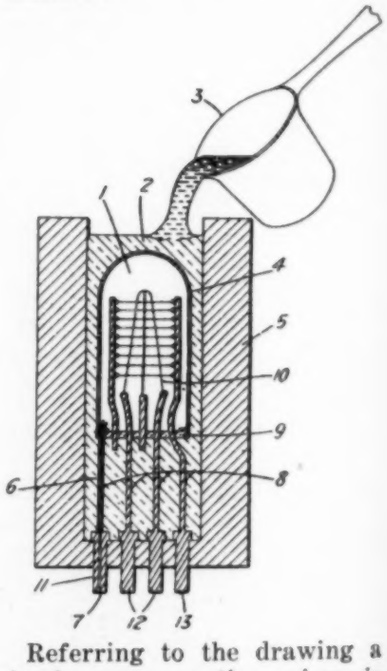
After the molten material has solidified and cooled to the surrounding temperature the exterior or concave mould may be removed, yielding a completely constructed, rigid tube.

With regard to evacuating the tube, this may be done to advantage before the tube has cooled off but after the molten substance is sufficiently stiff to maintain its form.

The air is drawn out through the thin hollow wire by for instance attaching a vacuum pump at the exterior end of the hollow wire and when the proper vacuum or gas density is obtained within the tube the wire is sealed by melting or fusing the hollow wire or soldering, etc.

It should be noted that while I have used the word vacuum tube, the invention is equally adaptable to other types of tubes such as gas filled tubes, electric lights, etc., and tubes having entirely different construction of the anode, cathode, and grid elements. All such devices come within the scope of the invention for the reason that it is a method of manufacture which is equally adaptable to the manufacture of all devices under the general class of electron tubes and tubes having vacuum or gas filled chambers.

A very important and new feature brought out by the method of manufacture is the moulding of the container and base at the same time, in the one operation, and of the same material.



Referring to the drawing a simple cross section view is shown for the reason that the invention is general and detailed views, it is believed, would be confusing and unnecessary.

1, designates the vacuum or gas filled chambers of the tube.

2, the molten glass or other suitable material.

3, the vat from which the molten material is poured into the mould.

4, the interior supporting mould which may be of nickel sheet, perforated, screening, or other suitable material properly shaped to support the molten material.

5, is the exterior mould which may be of any material or shape suitable for moulding glass or whatever molten material is used.

6, is a hollow wire which may be of alloyed metal to give proper expansion characteristics. It may be of other material and it may either be round, square or otherwise shaped without departing from the scope of the invention. If of metal, it may be used as one of element leads as is shown in the drawing.

7, is the point at which the hollow wire is sealed. If desired it may be sealed at another point.

8, are the four leads from the internal elements of the tube of which in this case the hollow wire 6 is one.

9, is a plate or disc of for instance mica to prevent the molten material from reaching the elements.

10, shows a wire filament which may be any kind of a cathode.

11, is the contact prong to which the plate lead is attached.

12, is the two contact prongs to which the two filament leads are attached.

13, is the contact prong to which the grid lead is attached.

1. The inventor claims a method of manufacturing vacuum tubes comprising molding the container in contradistinction to welding together previously molded parts.

2. A vacuum tube having the container and base molded in the same operation.

This patent was issued Feb. 21st, 1928 to Arthur H. Allen Jr., Philadelphia, Pa.

New Socket

(*Continued from page 284*)

with the hook, a spring secured in a recess on the face of the body beneath said yoke contact, a catch pressed by the spring into said yoke and hook notches to prevent disengagement of the yoke and hook, and a button operable from the exterior of the socket to release said catch.

4. An electric socket comprising a body portion and a cap portion having pairs of interlocking members, one pair extending circumferentially and shiftable into effective engagement after the cap portion has been placed on the body portion and rotated, a bolt slidable relative to said body engaging two of said interlocking members to lock them against relative shifting to ineffective position, to permit separation of the cap portion and body portion, and manually operable means for shifting said bolt.

Rotated Bolt

5. An electric socket comprising a body portion and a cap portion having pairs of interlocking members, one pair extending circumferentially and shiftable into effective engagement after the cap portion has been placed on the body portion and rotated, a bolt carried by the body and slidable relative to said members engaging two of said interlocking members to lock them against relative shifting to ineffective position, to permit separation of the cap portion and body portion, and manually operable means for shifting said bolt.

Interlocking

6. An electric socket comprising a body portion and a cap portion having pairs of interlocking members, one pair extending circumferentially and shiftable into effective engagement after the cap portion has

been placed on the body portion and rotated, a spring pressed bolt slidable relative to said body engaging two of said interlocking members to lock them against relative shifting to ineffective position, to permit separation of the cap portion, and body portion, and manually operable means for shifting said bolt.

This patent, which was issued Feb. 7th, 1928, to John Hohl of Newark, N. J., and assigned to Molded Socket Corp., is a good example of where use is made of molding compounds to achieve results otherwise impossible.

Gear Shift Balls

(*Continued from page 278*)

of pyroxylin plastic materials. These balls are made in a great variety of colors. The best sellers have been made in pearl colors.

These balls are made from pyroxylin sheet stock which is die pressed into the round shape and filled with a special filler. In order to do this, the ball is made in two parts which are cemented together and then filled.

This necessity of making the ball in two parts leads to some very beautiful color combinations. For example, it is possible to make the bottom of the ball of black sheet stock, while the top is made of beautiful white pearl.

In making gear shift balls, the manufacturer is faced with the problem of the various manufacturers' gear shift levers having different size threads to which the ball is screwed. This difficulty is overcome by the use of bushings. Ten different bushings are needed to take care of the various cars.

Another place in which the manufacturer has tried to dress up the interior of the car has been the instrument panel. There has been a decided improvement in the general appearance of this lately by using laminated phenolic sheets.

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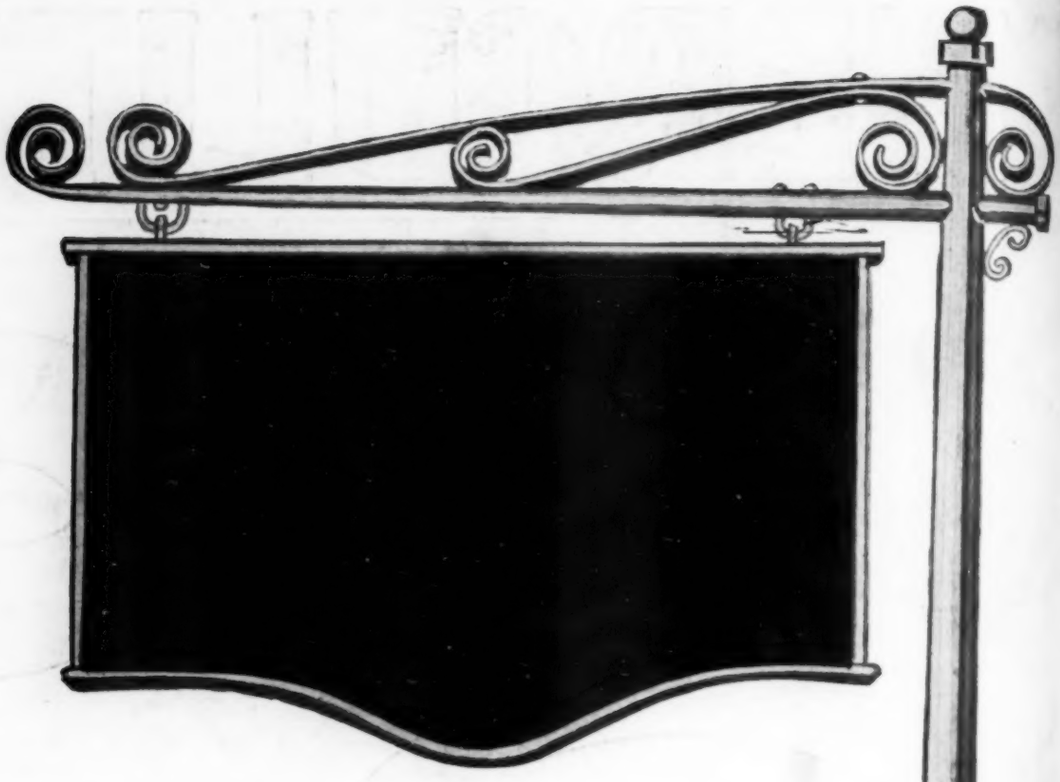

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